Algebra II Lesson 6.5/6.6 Finding Roots or Zeros of Cubic Functions Part II Mrs. Snow, Instructor

Now that we can predict the number and type of roots of a polynomial function we are going to learn how find the roots of a polynomial function. The **Rational Root Theorem** is a technique that identifies all possible rational roots of a polynomial.

How?

Factor both the constant term and the leading coefficient and then make ratios of all possible combinations of the factors: $\frac{factor \ of \ constant \ term}{factor \ of \ leading \ coefficient} = \frac{p}{q}$. These values are the *possible rational roots*.

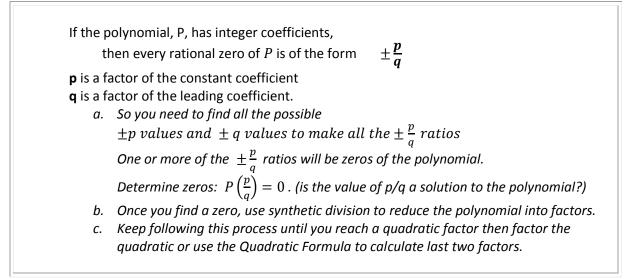
Which of these rational roots are actual roots?

When we put the ratios into the polynomial, those that result in a zero (make a true statement) ARE ROOTS.

Take a look at P(x) = (x - 2)(x - 3)(x + 4) multiplying the factors together we get: $P(x) = x^3 - x^2 - 14x + 24$

So the zeros of *P* are 2, 3, and - 4. These roots are some of possible rational roots derived using the Rational Root theorem.

Rational Zeros Theorem



Not	the only rational root is te: a cubic as 3 solutions the other 2 will be aginary or irrational. $2x^3 - 9x^2 - 11x + 8 = 0$
	$2x^3 - 9x^2 - 11x + 8 = 0$
$2x^3 + 2x^2 - 19x + 20 = 0$	

Note: use "store function" key to evaluate expressions for $F\left(\pm \frac{p}{q}\right)$

Find all possible roots and zeros of each cubic polynomial:

	1
 Using the Rational Root Theorem, find the possible rational roots, If a graphing calculator is available, use the table of values to determine a rational root. Use synthetic division and the rational root to reduce the polynomial, to a linear and quadratic factor. Use the quadratic formula to find the remaining roots. Always check the graph to make sure the roots match the graph. 	$x^3 + x^2 - x + 2 = 0$
$2x^3 - x^2 + 2x - 1 = 0$	$y = 2x^3 + 14x^2 + 13x + 6$